

## **REMARKS**

Claims 1-6 and 22-34 are pending. Claims 1-2 and 27-29 are amended to correct minor informalities. Support for the amendments to claims 1 and 2 can be found at page 4, lines 28-29, and page 11, line 4, respectively.

### **Rejection under 35 U.S.C. §112, Second Paragraph**

Claims 2-6 and 22-34 have been rejected on the ground that “the catalyst” was indefinite since claim 1 recites “catalyst” twice. To further clarify the claims, the second instance of “catalyst” has been deleted.

Claims 27-29 have been amended as suggested by the examiner.

### **Rejection under 35 U.S.C. §103(a) as unpatentable over Hepp et al. (U.S. Pat. No. 3,461,183) in view of Schuh et al. (WO 99/15715)**

Claims 1-6 and 23-34 have been rejected under 35 U.S.C. §103(a) as unpatentable over Hepp et al. in view of Schuh et al. This rejection is respectfully traversed.

Hepp et al. discloses a catalyst “for the dehydrogenation of steam-diluted alkanes, cycloalkanes, arylalkanes, and substituted alkanes.” Col. 1, lines 54-57. These catalysts are made by treating certain Group VIII metal catalysts that are supported on spinel compounds. Col. 1, lines 59-61. A list of other carriers including zirconia are mentioned, “but their use results in the formation of somewhat less active catalysts.” Col. 1, lines 69-72.

Schuh discloses a method for electrophoretically coating a 3-dimensional support such as

a felt. The coated articles may also be coated with a catalyst material. A primary advantage of Schuh's method is that the uniform coating reduces the "edge effect" in which the periphery of the porous matrix being coated receives a thicker coat than the interior. As noted by the examiner, Schuh et al. mention various possible advantages for use of the invention.

First, the claimed invention is nonobvious because there is no motivation in the cited references to apply Hepp's catalyst onto a support having large pores. The motivation cited by the examiner, low pressure drop, is not mentioned by Hepp et al. To the contrary, Hepp et al. state that the catalyst is effective at high pressures, so Hepp's process is apparently designed to be run at high pressures and does not have a need for low pressure drop. Although Schuh et al. broadly suggest a variety of possible advantages, there is no specific teaching of any advantage would likely occur from depositing Hepp's catalyst on Schuh's porous support. The motivation cited in the office action, to operate Hepp's process with low pressure drop, is the examiner's reasoning - it is not found in the cited references. Thus, the cited references lack any suggestion of the desirability of their combination.

Second, even if there were a motivation to combine the cited references, all of the pending claims are nonobvious over the prior art due to applicants' showing of superior and unexpected results. The examples show excellent catalytic behavior for the claimed catalyst in catalyzing the water gas shift reaction converting carbon monoxide and water to hydrogen and carbon dioxide. As shown, the porous catalyst exhibited superior performance as compared with the powder catalyst. There is no expectation from the prior art that a zirconia-supported, alkali-metal-modified, ruthenium would perform better on a porous substrate than as a powder.

Claim 25 is additionally patentable because it recites a zirconia support having relatively high surface area. Even if surface area were a result effective variable, it would not have been obvious to adjust the Hepp catalyst to obtain a high surface area. To the contrary, the Hepp catalyst is designed to operate for catalyzing the dehydrogenation of alkanes at high temperatures and in the presence of steam. Under these conditions it is well known that high surface area supports are not stable. Furthermore, Hepp et al reduce and calcine their catalyst at much higher temperatures than in applicants' catalyst synthesis. This will result in a relatively low surface area catalyst in Hepps' catalyst.

Claims 5, 6, 30, 31, 33, and 34 are additionally patentable because they recite water-gas shift catalyst activities that are not suggested nor inherently possessed by Hepp's catalyst. Hepp uses different synthetic procedures for making their catalyst. For example, Hepp's temperatures of reduction and calcination are substantially higher. It is well-known that, even for similar or the same composition, catalysts made by different methods have different properties. To provide further evidence of this knowledge, attached is a literature reference showing that catalysts having the same composition but prepared five different ways, produce catalysts having widely varying properties.

The law on inherency is well established. See MPEP 2112. "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact

that a certain thing may result from a given set of circumstances is not sufficient.' " *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (quoting Continental Can Co. v. Monsanto Co., 20 USPQ2d 1746, 1749 (Fed. Cir. 1991) and In re Oelrich, 212 USPQ 323, 326 (CCPA 1981).

Since the catalysts were made by different routes, the catalyst of Hepp et al. will not inherently possess the claimed properties. Furthermore, it would not have been obvious to modify Hepp's catalyst to obtain better water-gas shift catalyst activities. To the contrary, the catalyst of Hepp et al. was designed for alkane dehydrogenation. Therefore, claims 5, 6, 30, 31, 33, and 34 are additionally patentable over the prior art.

Accordingly, withdrawal of the section 103 rejection is respectfully requested.

Rejection under 35 U.S.C. §103(a) as unpatentable over Hepp et al. (U.S. Pat. No. 3,461,183) in view of Schuh et al. (WO 99/15715) and further in view of Hiramatsu et al. (EP 480,461).

Claim 22 has been rejected as above and further in view of Hiramatsu.

This rejection is traversed for the reasons discussed above with regard to Hepp and Schuh.

## **CONCLUSION**

If the Examiner has any questions or would like to speak to Applicants' representative, the Examiner is encouraged to call Applicants' attorney at the number provided below.

Respectfully submitted,

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